Environmental science

DEVELOPMENT AND APPLICATION OF FISH (FLUORESCENCE IN-SITU HYBRIDIZATION) IN AN UNDERGRADUATE MICROBIOLOGY LABORATORY

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Fluorescence in-situ hybridization (FISH) is a rapid, sensitive, and versatile technique utilized in a wide range of cell biology and environmental microbiology studies, yet it has seldom been used in an undergraduate laboratory. Recently, FISH has been developed in two international research laboratories as a method of choice to detect *Escherichia coli*, a well-known fecal coliform. Unlike most traditional aquatic bacteriology tests, FISH can be completed within a working day. The oligonucleotide probe used to detect the microorganism(s) can be specific for a phylogenetic group, species, or even a strain of bacteria. We have used a fluorescein-labeled 19-mer previously shown to be specific for *E. coli* 16S ribosomal RNA to detect mid-log *E. coli* and *Enterobacter aerogenes* (negative control) cells. Bacteria were attached to a nitrocellulose filter via membrane filtration and subjected to hybridization with the probe. Both the cells stained with DAPI (4'-6-diamidino-2-phenylindole) and the probe were easily detected within two and a half hours after harvesting the sample. The method is still being optimized in order to minimize the background fluorescence observed with *E. aerogenes*. For the past several years, Albion College's Environmental Microbiology students have investigated bacteria from Rice Creek, a stream whose health has raised concerns in the greater Albion community. Incorporation of FISH into an undergraduate microbiology laboratory to detect fecal coliforms would allow for rapid screening of freshwater and the assessment of water quality by the students. This would further increase students' interest in environmental sciences whereby an application of a modern technique is used in a project with tangible outcomes and a sense of ownership.

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